Numerical methods

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Learning Objectives

- After completing this lesson, you will be able to:
  - Be familiar with the application of numerical methods.
  - Compare different numerical methods.

Discretization

- The central process in CFD is the process of discretization.
  - Take differential equations with an infinite number of DoF and reduce it to a system of finite DoF.
- Error Creep happens during discretization and must be controlled to ensure that:
  - We solved the current equations
  - The error can be decreased as the DoF change

Discretization methods

- Finite Volume
  - Primarily used in aerodynamics applications
  - Solves an integral form of the governing equations so that local continuity property do not have to hold.
- Finite Difference
  - Used to place a finite limit of the derivative calculation
  - Limited by the complexity of the domain
- Finite Element
  - Used for complicated computational regions

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